C Unit 8 C{PRIVATE }

Transportation of Hazardous Materials and Waste

Table of Contents

C Unit 8 C{PRIVATE }

Transportation of Hazardous Materials and Waste

As the transport of hazardous materials increases in the U. S., accidents involving these shipments likewise increase. Public concern over the risk of chemical exposure to hazardous materials during transport have prompted both local and federal governments to promulgate regulations, increase enforcement, and to train emergency response teams. This unit gives an overview of the regulations governing the transport of hazardous materials as set forth in 49 CFR Part 171 (General Information, Regulations and Definitions), Part 172 (Hazardous Materials Tables and Hazardous Materials Communication Regulations), Part 173 (General Requirements for Shipments and Packaging), and 40 CFR,Part 177 - Carriage by Public Highway (Driver Training, Loading and unloading, segregation and separation and accidents), Part 178 (specifications for packaging), Part 262 (standards applicable to generators of hazardous waste) and 263 (standards applicable to transporters of hazardous waste). These regulations cover approximately 700 pages; thus, this unit only discusses the general requirements when transporting hazardous materials by road, and excludes a multitude of details that must be followed. States have the option of imposing additional regulations on the transport of hazardous materials.

This unit focuses mainly on hazardous waste rather than the broader category of hazardous materials.

8.1 FEDERAL REGULATIONS

The first federal law regulating the transport of hazardous materials was passed in 1866 and covered shipments of explosives and flammables. Other laws followed, but it was not until 1966, when the Department of Transportation (DOT) was formed, that safety standards for a wide range of hazardous materials were promulgated.

In 1975, the Hazardous Materials Transportation Act (HMTA) was passed. This legislation consolidated the DOT regulatory authority over hazardous materials and clarified regulatory and enforcement responsibilities. The DOT was organized into five basic administration units (Coast Guard, Federal Aviation Administration, Federal Highway Administration, Federal Railroad Administration, and Research and Special Programs Administration). The Office of Hazardous Materials Transportation is under the Research and Special Programs

NOTES

Administration. This office is responsible for designation and classification of hazardous materials, prescription of safety standards for containers, establishing requirements for markings, labels, and placards, issues packaging exemptions, and inspection and enforcement. Current regulations are found in 49 CFR as cited above. However, extensive revisions to these regulations, commonly called HM-181, were adopted in late 1991 and will become mandatory in phases with full implementation in 1996. Most of these regulatory changes pertain to packaging standards and material classification.

The special training requirements for transporters of hazardous materials/waste is regulated under DOT 49 CFR 172 Subpart H and 177.816, EPA 40 CFR 311, and OSHA 29 CFR 1910.120. All of these regulations involve specific training requirements for those persons engaged in the handling and/or transportation of hazardous materials/waste.

The Environmental Protection Agency (EPA) regulates the shipment of hazardous wastes. Through Subtitle C of the Resource Conservation and Recovery Act of 1976, the EPA established standards for transporters of hazardous wastes and coordinated these regulations with the DOT. With respect to transportation, RCRA identifies hazardous waste, specifies markings on containers, and tracks the movement of hazardous wastes through the use of a manifest system. DOT requirements for labeling, placarding, container use, etc. have been adopted by the EPA, thus making the hazardous waste transportation requirements consistent between the two agencies.

The Nuclear Regulatory Commission (NRC) regulates the transport of radioactive materials. This Commission sets standards for design and performance of packaging, advance notification of shipments, licensing of transporters, and inspection.

8.2 DEFINITION AND CLASSIFICATION OF HAZARDOUS MATERIALS

The DOT defines a hazardous material as a substance or material that has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. The DOT has categorized hazardous materials into hazard classes that are defined in Table 1.

NOTES

Note: The changes that are taking place in regulations concerning the transporting and handling of hazardous materials/waste is sometimes difficult to keep pace with. The concept of "Hazard Communications" as it relates to DOT has both immediate and long term effects for the industry. The new HM-181 Hazardous Materials regulations is changing the way we describe, label, mark, placard, and package hazardous materials/waste. This will enable the United States business community to be more compatible with the international standards in a rapidly expanding global economy. The transitional provisions for implementation based on United Nations (UN) Recommendations (HM-181) are contained in the current DOT regulations 49 CFR 171.14, and can be found in the October 1, 1992 Title 49 CFR 100 - 177 and Title 49 CFR 178 - 199.

For the "class 9 (miscellaneous hazardous materials/waste) designation, the term "hazardous waste" is defined according to the RCRA definition presented in previous units. The term "hazardous substance" is defined by DOT as a listed material (Appendix to section 172.101 in 49 CFR), a quantity that exceeds the reportable quantity, and a mixture that is in a concentration by weight that equals or exceeds the concentration corresponding to the reportable quantity. (R.Q.)

With the new HM-181 regulations now in effect the DOT Hazard Classes and definitions have changed. I have included the new classes and definitions with reference to where they appear in the CFR's. The examples can be included if required.

NOTES

I**Table 1** D.O.T HAZARD CLASS AND DEFINITION

{PRIVATE }**CLASS I.....EXPLOSIVES 49 CFR 173.50**

DIVISION 1.1 MASS EXPLOSION HAZARD

DIVISION 1.2 PROJECTION HAZARD

DIVISION 1.3 FIRE HAZARD AND MINOR BLAST OR PROJECTION HAZARD

DIVISION 1.4 MINOR EXPLOSION HAZARD

DIVISION 1.5 VERY INSENSITIVE ARTICLES

DIVISION 1.6 EXTREMELY INSENSITIVE ARTICLES

CLASS 2.....GASES 49 CFR 173.115

DIVISION 2.1 (FLAMMABLE GASSES) A GAS AT 20° C. OR LESS AND 101.3 Kpa OF PRESSURE AND A BOILING POINT OF 20° C. OR LESS.

(1) Ignitable in mixture off 13% or less by volume with air.

(2) Has a flammable range of at least 12%.

DIVISION 2.2 (NON-FLAMMABLE) EXERTS AND ABSOLUTE PRESSURE OF 280 Kpa AT 20° C.

DIVISION 2.3 (GAS POISONOUS BY INHALATION) MATERIAL WHICH HAS A PRESSURE OF 101.3 Kpa AND BOILING POINT OF 20° C. OR LESS. AND HAS AN LC-50 VALUE FOR ASSIGNMENT OF HAZARD ZONES A, B, C, OR D.

CLASS 3.....49 CFR 173.120

FLAMMABLE LIQUID **MEANS ANY** LIQUID HAVING A FLASH POINT OF NOT MORE THAN 60° C. OR (140° F.)

COMBUSTIBLE LIQUID **MEANS A LIQUID THAT DOES NOT MEET THE DEFINITION OF ANY OTHER CLASS, EXCEPT CLASS 9, AND HAS A FLASH POINT ABOVE 60° C. (140° F.) AND BELOW 93° C. (200° F.)**

NOTE: A FLAMMABLE LIQUID WITH A FLASH POINT ABOVE 38° C. (100° F.) MAY BE RECLASSED AS COMBUSTIBLE LIQUID.

CLASS 4.....49 CFR 173.124

DIVISION 4.1 (FLAMMABLE SOLID)

1. WETTED EXPLOSIVES
2. SELF REACTIVE MATERIALS
3. READILY COMBUSTIBLE SOLIDS

NOTES

II**Table 1** D.O.T. HAZARD CLASSES AND DEFINITIONS (Cont)

{PRIVATE } DIVISION 4.2 (SPONTANEOUSLY COMBUSTIBLE)

1. PYROPHORIC MATERIALS
2. SELF-HEATING MATERIALS

DIVISION 4.3 (DANGEROUS WHEN WET)
A MATERIAL THAT, BY CONTACT WITH WATER, IS LIABLE TO BECOME SPONTANEOUSLY COMBUSTIBLE OR GIVE OFF FLAMMABLE OR TOXIC VAPORS.

CLASS 5.....49 CFR 173.127 & 128

DIVISION 5.1 (OXIDIZER) MEANS A MATERIAL THAT MAY, GENERALLY BY YIELDING OXYGEN, CAUSE OR ENHANCE COMBUSTION OF OTHER MATERIALS.

DIVISION 5.2 (ORGANIC PEROXIDE) MEANS AN ORGANIC COMPOUND CONTAINING OXYGEN (0) IN THE BIVALENT -0-0- STRUCTURE AND WHICH MAY BE CONSIDERED A DERIVATIVE OF HYDROGEN PEROXIDE.

NOTE: DIVISION 5.2 MATERIALS ARE ASSIGNED TO A GENERIC SYSTEM WHICH CONSISTS OF SEVEN TYPES....TYPE A TO TYPE G. (173.128 (b) AND (c).

CLASS 6.....49 CFR 173.132 & 134

DIVISION 6.1 (POISONOUS MATERIALS) MEANS A MATERIAL, OTHER THAN A GAS, KNOWN TO BE SO TOXIC TO HUMANS AS TO AFFORD A HAZARD TO HEALTH DURING TRANSPORTATION.

1. ORAL TOXICITY
2. DERMAL TOXICITY
3. INHALATION TOXICITY

DIVISION 6.2 (ETIOLOGIC AGENT) AN "INFECTIOUS SUBSTANCE" MEANS A VIABLE MICRO-ORGANISM, OR ITS TOXIN, WHICH CAUSE OR MAY CAUSE DISEASE IN HUMANS OR ANIMALS.

1. DIAGNOSTIC SPECIMEN
2. BIOLOGICAL PRODUCT
3. REGULATED MEDICAL WASTE

CLASS 7.....RADIOACTIVE 49 CFR 173.403

DIVISION 7 A MATERIAL THAT SPONTANEOUSLY EMITS IONIZING RADIATION HAVING SPECIFIC ACTIVITY OF GREATER THAN 0.002 MICROCURIE PER GRAM.

CLASS 8.....CORROSIVE 49 CFR 173.136

DIVISION 8 A LIQUID OR SOLID THAT CAUSES VISIBLE OR IRREVERSIBLE ALTERATIONS IN HUMAN SKIN TISSUE AT SITE OF CONTACT, OR A LIQUID THAT HAS A SEVERE CORROSION RATE ON STEEL OR ALUMINUM.

NOTES

III Table 1 D.O.T. HAZARD CLASSES AND DEFINITION (con't)

{PRIVATE }**CLASS 9.....49 CFR 173.140**

DIVISION 9	(MISCELLANEOUS HAZARDOUS MATERIALS) MEANS A MATERIAL WHICH PRESENTS A HAZARD DURING TRANSPORTATION BUT WHICH DOES NOT MEET THE DEFINITION OF ANY OTHER HAZARD CLASS. 1. MATERIAL WHICH HAS AN ANESTHETIC, NOXIOUS OR OTHER ANNOYANCE TO FLIGHT CREWS. 2. ANY MATERIAL WHICH MEETS THE DEFINITION OF 49 CFR 172.8 FOR AN ELEVATED. 3. A HAZARDOUS SUBSTANCE OR A HAZARDOUS WASTE.

ORM D.....49 CFR 173.144

OTHER REGULATED MATERIAL D	MEANS A MATERIAL SUCH AS A CONSUMER COMMODITY, WHICH ALTHOUGH OTHERWISE SUBJECT TO THE REGULATIONS, PRESENTS A LIMITED HAZARD IN TRANSPORTATION DUE TO ITS FORM, QUANTITY AND PACKAGING. IT MUST BE A MATERIAL FOR WHICH EXCEPTIONS ARE PROVIDED.

8.3 DEFINITION OF HAZARDOUS WASTE GENERATORS AND TRANSPORTERS

Under RCRA, a generator is defined as "... any person, by site, whose act or process produces hazardous waste ... or whose act first causes a hazardous waste to become subject to regulation." In other words, the generator is the entity that creates waste that fits the definition of hazardous. When transport is involved, the DOT considers the generator as the shipper.

The transporter moves the hazardous waste from one location to another; the DOT usually refers to the transporter as the "carrier." Some actions of the transporter can change its status to that of a

NOTES

generator and thus subject the transporter to a host of additional regulations under RCRA. This can happen if a transporter mixes hazardous waste, retains the waste for longer than the specified time, imports hazardous waste, or discharges the waste rather than transports it to an approved facility.

8.4 RESPONSIBILITIES OF THE GENERATOR IN TRANSPORTING HAZARDOUS WASTE

Prior to transport of a hazardous waste, the generator must fill out a Uniform Hazardous Waste Manifest (EPA Form 8700-22), a form that substitutes for a shipping paper. Some states have taken this federal form and require additional information. In such cases, the state Uniform Hazardous Waste Manifest must be used when shipments originate or terminate in that state. In addition, make sure that the manifest to be used is current. The expiration date of the manifest is in the upper right hand corner.

The generator is responsible for correctly filling out the hazardous waste manifest. In addition, the generator must receive and retain a copy of the manifest that is signed by the designated receiving facility. The manifest must be retained for 3 years and is used as basis for biennial reports. If the generator does not receive a fully signed copy of the manifest from the designated facility within a specified time, a follow-up investigation must be initiated by the generator according to EPA guidelines.

Figure 1 illustrates a blank uniform hazardous waste manifest. Following are item-by-item instructions for filling out the manifest. Note that the items with letters A through K are optional at this time. However, when states issue the Uniform Hazardous Waste Manifest, they often require most or all of these items to be completed. Information required in these items is self-explanatory with exception of items J and K. Item J is often used to enter the "Profile Number" that is assigned by the TSD facility to the particular waste that is being shipped to them. Item K is often used for the DOT Emergency Guide Number.

The generator of the hazardous waste fills out items 1 through 16, the transporter fills out items 17 and when necessary 18, and the receiving facility fills out items 19 and 20. The item-by-item instructions are:

Item 1: This is the generator's twelve-digit identification number assigned by the EPA and the unique five-digit number assigned to the manifest by the generator.

manifest 1

NOTES

Item 2: The total number of pages used to complete the manifest is shown here, that is, the first page (EPA Form 8700-22) plus the number of Continuation Sheets (EPA Form 8700-22A), if any.

Item 3: This is the name and mailing address of the generator. The address should be the location that will manage the returned manifest forms.

Item 4: This is a telephone number where an authorized agent of the generator may be reached if an emergency occurs.

Item 5: The company name of the first transporter who transported the waste.

Item 6: The EPA-assigned twelve-digit identification number of the first transporter identified in item 5.

Item 7: When applicable, the company name of the second transporter who transported the waste. If more than two transporters are used to transport the waste, use one or more Continuation Sheet(s) (EPA Form 8700-22A) and list the transporters in the order they transported the waste.

Item 8: When applicable, the EPA-assigned twelve-digit identification number of the second transporter identified in item 7.

NOTE: If more than two transporters handle the same load of hazardous waste, each additional transporter's company name and EPA-assigned twelve-digit identification number in items 24-27 on the Continuation Sheet (EPA Form 8700-22A) must be entered. Each Continuation Sheet has space to record two additional transporters. Every transporter used between the generator and the designated facility must be listed.

Item 9: The company name and site address of the facility designated to receive the waste. The address must be the site address, which may differ from the company mailing address.

Item 10: The EPA-assigned twelve-digit identification number of the

NOTES

designated facility identified in item 9.

Item 11: This is the DOT proper shipping name, hazard class, and ID number (UN/NA) Packaging Group (PG) for each waste as identified in 49 CFR 171 through 177. If additional space is needed for waste descriptions, these additional descriptions are entered in item 28 on the Continuation Sheet (EPA Form 8700-22A). Note that if hazardous material is shipped, an "X" must be placed in the "HM" column.

NOTE: If you are transporting in a tanker with a DOT exemption number, it must be noted on item 11 below the waste description.

NOTE: If the word "waste" is not included in the hazardous material description, the proper shipping name for a hazardous waste must include the word "waste" preceding the shipping name of the material. For example: waste acetone.

Also, materials using a generic name of "N.O.S." must include the technical name of the product shown in association with the basic description. For example, "Flammable Liquid, n.o.s. (cyclohexane oxide) UN1990". Trade names may not be used for the technical name.

Item 12: The number of containers for each waste and the appropriate abbreviation for the type of container.

Item 13: The total quantity of waste described on each line.

Item 14: The appropriate abbreviation for the unit of measure.

Item 15: Generators may use this space to indicate special transportation, treatment, storage, or disposal information, or Bill of Lading information. States may not require additional, new, or different information in this space. In addition, an emergency response telephone number must be provided on the manifest, preferably in Item 15.

Item 16: The generator must read, sign (by hand), and date the certification statement. If the waste is shipped other than by highway, the word "highway" must be lined out and the appropriate mode (rail, water, or air) inserted. If the waste is shipped by another mode, in addition to the highway, the appropriate additional mode (for example, "and rail") must be written in.

Item 17: The name of the person accepting the waste on behalf of

NOTES

the first transporter. That person must acknowledge acceptance of the waste described on the manifest by signing and entering the date of receipt.

Item 18: When applicable, the name of the person accepting the waste on behalf of the second transporter. That person must acknowledge acceptance of the waste described on the manifest by signing and entering the date of receipt.

Item 19: The authorized representative of the designated (or alternate) facility's owner or operator must note in this space any significant discrepancy between the waste described on the manifest and the waste actually received at the facility.

Item 20: The receiving facility must type or print clearly the authorized facility owner or operator's name with the corresponding signature and give the current month, day, and year.

8.5 RESPONSIBILITIES OF THE TRANSPORTER

8.5.1 General Requirements

Prior to accepting hazardous waste for shipment, the transporter must obtain an identification number from the EPA.

The transporter must use only RCRA permitted facilities and cannot store waste for more than 10 days without becoming subject to regulations concerning storage facilities. Generator regulations may apply if the transporter mixes hazardous wastes.

DOT regulations specify that transporters cannot accept hazardous materials that have not been properly identified, packaged, marked, labeled, and manifested. Before leaving the generator's facility with a load of hazardous waste, the transporter must sign and date the manifest to acknowledge acceptance of the hazardous waste from the generator. The transporter must return a signed copy to the generator before leaving the generator's property. The transporter must ensure that the remaining pages of the manifest accompany the hazardous waste.

A transporter who delivers a hazardous waste to another transporter or

NOTES

to the designated disposal facility must:

- obtain the date of delivery and the handwritten signature of that transporter or of the owner or operator of the designated facility on the manifest;
- retain one copy of the manifest in accordance with recordkeeping requirements described in the next section; and
- give the remaining copies of the manifest to the accepting transporter or designated facility.

Note that a transporter who transports hazardous waste from a generator who generates between 100 and 1000 kilograms (small quanity of generator) of hazardous waste in a calendar month need not comply with these requirements, provided that the transporter records on a manifest the following information for each shipment:

- the name, address and EPA Identification Number of the generator of the waste;
- the quantity of waste accepted;
- all DOT-required shipping information; and
- the date the waste is accepted.

The transporter carries the manifest when transporting waste to the disposal facility. In addition, the transporter retains these records for a period of at least three years after termination or expiration of the agreement.

The requirements for transportation of hazardous waste are covered in more detail in Unit 1.

8.5.2 Compliance with the Manifest

The transporter must deliver the entire quantity of hazardous waste that he has accepted from a generator or a transporter to the facility designated on the manifest. If the hazardous waste cannot be delivered to the designated facility because an emergency prevents delivery, the transporter must deliver the entire quantity of hazardous waste to the alternate facility designated on the manifest, if such a facility is designated.

If the hazardous waste cannot be delivered in accordance with the manifest, the transporter must contact the generator for further directions and must revise the manifest according to the generator's instructions.

8.5.3 Recordkeeping

NOTES

A transporter of hazardous waste must keep a copy of the manifest signed by the generator, himself, and the next designated transporter or the owner or operator of the designated facility for a period of three years from the date the hazardous waste was accepted by the initial transporter. In addition to the EPA manifest, the transporter may carry shipping papers that duplicate many items in the manifest. However, retention of shipping papers is not required by the EPA.

8.5.4 Discharges during Transport

Federal regulations define a discharge as "the accidental or intentional spilling, leaking, pumping, pouring, emitting, or dumping of hazardous waste into or on any land or water." The EPA requires that transporters take appropriate emergency response action to contain and clean up all discharges that occur during transport. In addition, appropriate EPA mandated mitigation efforts may be needed to reduce impacts on human health and the environment.

The transporter is required to notify the National Response Center within 24 hours if the spill exceeds reportable quantities. Reportable quantities range from 1 pound to 5000 pounds, depending on the substance as listed in 40 CFR 302. Releases of reportable quantities of extremely hazardous substances (40 CFR 355) also require immediate notification of the local emergency planning committee.

Following the emergency, the EPA requires that all normal regulations for the final disposition of the hazardous waste must be followed. The DOT requires a written report of the incident.

On August 17, 1990, an emergency response communication rule was published with a mandatory implementation date of December 31, 1990. These requirements are summarized as follows.

- The shipping paper or uniform hazardous waste manifest must include a 24 hour emergency response telephone number. This is the generator's (or shipper's) responsibility. The generator could make an agreement with an agency such as CHEMTREC to act as their agent to provide this information and be in compliance.

- Information necessary for emergency response must be on or attached to the uniform hazardous waste manifest or shipping paper. This requirement could be satisfied with a

NOTES

material safety data sheet, a copy of the DOT Emergency Response Guidebook, or other comparable information. In addition, the motor carrier must have emergency response information available. This information includes a basic description of the hazardous materials, immediate hazards to health, risks of fire or explosion, immediate precautions to be taken in the event of an accident, immediate methods for handling fires, initial methods for handling spills or leaks in the absence of fire, and preliminary first aid measures.

- The transporter is required to file a written report in duplicate on DOT form F 5800.1 (Rev 6/89) to the DOT within 30 days of a release of ANY quantity of Hazardous Waste discharged during transportation (49 CFR 171.16)

8.6 RESPONSIBILITIES OF THE RECEIVING FACILITY

The hazardous waste receiving facility must continue the tracking system that was started with the generator and continued with the transporter. This cradle-to-grave tracking is an integral part of the federal regulations. Key components are as follows.

When a facility receives hazardous waste accompanied by a manifest, the owner or operator must:

- check the manifested hazardous wastes to ensure that the shipped waste can be accepted at the receiving facility;
- sign and date each copy of the manifest to certify that the hazardous waste covered by the manifest was received;
- note any significant discrepancies in the manifest in each copy of the manifest;
- immediately give the transporter one copy of the signed manifest;
- send a copy of the manifest to the generator within 30 days after the delivery; and
- retain at the facility a copy of each manifest for at least three years from the date of delivery.

8.7 MANIFEST DISCREPANCIES

Manifest discrepancies are differences between the quantity or type of hazardous waste designated on the manifest, and the quantity or type of hazardous waste a facility actually receives. Significant discrepancies in quantity are defined as follows:

- For bulk waste, a significant discrepancy is a variation exceeding "10% in weight.
- For batch waste, a significant discrepancy is any variation

NOTES

in piece count, such as a discrepancy of one drum in a truckload.

Significant discrepancies in type are obvious differences that can be discovered by inspection or waste analysis, such as waste solvent substituted for waste acid, or toxic constituents not reported on the manifest or shipping paper.

Upon discovering a significant discrepancy, the owner or operator must attempt to reconcile the discrepancy with the waste generator or transporter. If the discrepancy is not resolved within 15 days after receiving the waste, the owner or operator must immediately submit a letter to the Regional EPA Administrator describing the discrepancy and all attempts to reconcile it, along with a copy of the relevant manifest or shipping paper.

8.8 LABELING AND MARKING

Prior to shipping hazardous materials or waste, the container holding the hazardous material must be appropriately labeled and marked according to DOT and EPA specifications. The purpose of the DOT label is to identify the general hazards associated with virgin materials. The EPA marking is specific to hazardous wastes and identifies the origin and nature of the waste.

Marking shall include the proper shipping name and UN/NA identification number for the hazardous materials shown in the Hazardous Material Table 49 CFR 172.101.

The proper shipping name for Hazardous Waste is not required to include the word "waste" if the package bears the EPA marking described by 40 CFR 262.32. "Hazardous Waste Marking". (Figure 2)

The DOT defines a label as a small warning sign that is placed on individual containers that will be transported in a vehicle. The label may provide guidance for storage during transport, placarding, special care, and response if discharged. The design of the label is specified by the DOT.

There is a conflict between EPA 40 CFR 262.32 revised July 1, 1992 and DOT 49 CFR 172.301, in reference to the 110 gallon rating of a package. The new DOT 49 CFR 172.301 Revised October 1, 1992 has eliminated the 110 gallon requirement and replaced it with **NON-**

NOTES

BULK PACKAGING. Non-bulk packaging is now defined in 49 CFR 171.8 as:

(1) A maximum capacity of less than 450 L. (119 gallons) as a recepticle for liquid.

(2) A maximum net mass less than 400 Kg (882 pounds) and a maximum capacity of less than 450 L. (119 gallons) as a recepticle for solid, or:

(3) A water capacity of greater than 454 Kg (1001 pounds) or less as a recepticle for gas.

8.8.1 DOT Labels

8.8.1.1 Special Provisions

No person may transport any container bearing a DOT label unless the labeled container actually contains a hazardous material or hazardous waste and the affixed label accurately reflects the hazard class associated with the materials being shipped. In addition, no person may offer for transportation, and no carrier may transport a package bearing any marking or label which by its color, design, or shape could be confused with or conflict with a DOT or EPA hazardous material label.

When hazardous materials in different hazard classes are packed within the same packaging, or within the same outside container or overpack, the packaging, outside container, or overpack must be labeled as required for each class of hazardous material contained therein.

Subsidiary Hazard Labels: Each package containing a hazardous material, shall be labeled with primary and subsidiary hazard labels as specified in Column 6 of 172.101 Hazardous Material Table. For other than Class 1 (Explosive) or Class 2 (Gases) they shall be labeled in accordance with the Subsidiary Hazard Label Chart 49 CFR 172.402(a)(2). The appropriate hazard class or division shall be displayed in the lower corner of a primary hazard label and may not be displayed on a subsidiary hazard label.

8.8.1.2 Placement of Labels

Each label must be printed on or affixed to the surface of the package near the marked proper shipping name. When two or more different labels are required, they must be displayed or affixed next to each other. A label will contain the appropriate hazard class number and, when appropriate the division number. Finally, a label must not be obscured by markings or attachments.

8.8.1.3 Label Specifications

NOTES

Each label that is affixed to or printed on a package must be durable and weather-resistant. Each label must be at least four inches on each side with each side having a black solid line border 1/4 inch from the edge. A label will contain the appropriate hazard class number and, when appropriate the division number. Except for size and color, the printing, inner border, and symbol on each label must be specified by the DOT. The DOT has distinctive labels corresponding to the hazard classes previously presented.

8.8.2 EPA Markings

Markings are provided to assist motor carrier personnel in recognizing packages and to properly respond to emergency situations (Figure 2).

If PCB wastes are transported, the EPA requires a special mark identifying the PCB's and giving emergency information (Figure 3).

figure 3
figure 4

Before transporting hazardous waste or offering hazardous waste for transportation off-site, the EPA requires that the generator mark each container of 110 gallons or less. As previously explained there is a discrepancy between the EPA definition (40 CFR 262.32) and the DOT (49 CFR 171.8).

> HAZARDOUS WASTECFederal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
> Generator's Name and Address
> Manifest Document Number

Actual labels may contain additional information.

Other information that may be requested on the marking include the proper DOT shipping name and UN (United Nations) or NA (North America) shipping number, the generator's EPA identification number, the EPA waste number, accumulation start date (the date hazardous waste was first put in the container), and the Uniform Hazardous Waste Manifest number. If this information plus the designation Class 9 is on

NOTES

the marking, the class 9 labels are required to meet the DOT labeling requirement.

Finally, the receiving facility may require specific information, such as the waste profile number. This information is commonly stenciled on the container.

8.9 DOT PLACARDING

The DOT requires certain vehicles transporting hazardous materials to have signs (or placards) on the outside of the vehicles that specify the type(s) of hazardous materials. No person may affix a placard on a transport vehicle unless:

- the material being transported is a hazardous material; and
- the placard accurately represents the hazard class of the material being transported.

In addition, no person may affix or display any sign or other device on a transport vehicle, that by its color, design, shape or content could be confused with any placard required by the DOT.

8.9.1 General Requirements

Any vehicle containing hazardous material must have the appropriate placard displayed on each end and each side. A transport vehicle or freight container with two or more classes of materials that require different placards may be placarded "DANGEROUS" in place of the separate placarding. However, when 2,268 Kg (5000 pounds) or more of one class of material are loaded at one loading facility, the placard specified for that class must be applied.

When the gross weight of all hazardous materials is less than 454 Kg (1001 pounds) a placard may not be required. A non-bulk packaging, less than 450 L (119 gallons) liquid or solid, that contains only the residue of a hazardous material covered by Table 2 of 49 CFR 172.504(e) need not be included in determining placarding requirements.

For transport vehicles, freight containers, and rail cars containing the minimum quantity requiring a placard, the placard contains the hazard class number (symbols may be included). Placards for tank cars, cargo tanks, portable tanks, and bulk packaging, the placard consists of the hazard class number (symbols may be used) and the four-digit UN or NA number.

8.9.2 Affixing Placards

NOTES

Any person offering a motor carrier a hazardous material for transportation by highway must provide the motor carrier with the required placards for the material being offered. This must be done prior to or at the same time the material is offered for transportation, unless the carrier's motor vehicle is already placarded for the material being transported. No motor carrier may transport a hazardous material in a motor vehicle unless the placards required for the hazardous material are affixed as required by the DOT.

8.9.3 Visibility and Display of Placards

Each placard on a motor vehicle must be readily visible from the direction it faces. The required placarding of the front of a motor vehicle may be on the front of a truck-tractor instead of or in addition to the placarding on the front of the cargo body to which

table 2 correlation of hazard class
table 2 cont
placard substitution table
a truck-tractor is attached.

Each placard on a transport vehicle, portable tank, or freight container must:

- be securely attached or affixed in a holder;
- be located clear of devices such as ladders, pipes, doors, and tarpaulins;
- be located so that dirt or water is not directed to it from the wheels of the transport vehicle, if possible;
- be located away from any marking (such as advertising) that could substantially reduce its effectiveness;
- have the words or identification number (when authorized) printed on it displayed horizontally, reading from left to right; and
- be maintained by the carrier in a condition so that the format, legibility, color, and visibility of the placard will not be substantially reduced due to damage, deterioration, or obscurement by dirt or other matter.

The DOT has twenty-three basic placards that roughly correspond to the hazard classes and labels previously discussed (Table 2). The placard is modified to show the UN or NA number of the hazardous

NOTES

material across the center of the placard when hazardous materials are shipped in tanks.

Shipments of hazardous waste that are classified as Class 9 require placarding for domestic transportation. Shipments of hazardous waste that meet one of the hazard classes (other than Class 9) previously listed require the appropriate hazard class placard.

8.10 ADDITIONAL READING

49 CFR 171-172-173-177. This reference is the Department of Transportation Regulations regarding the transport of hazardous materials.

40 CFR 262-263. The Environmental Protection Agency regulations concerning hazardous waste are found here. The regulations cover the generator of hazardous wastes and transporter requirements.

Handling Hazardous Materials, Department of Safety, American Trucking Association, 1990 Edition. The book was written for the transporter of hazardous materials and includes shipping papers, manifesting, labeling, and placarding. This reference includes extensive tables dealing with naming hazardous materials, class identification number, labels, packaging, placards, hazardous substance synonyms, reportable quantities, IMO class, and other information.

Additional Reading Materials needs to be up-dated to meet the current regulatory requirements i.e., New Hazardous Materials Regulations (HM-181), Training for Safe Handling of Hazardous Materials (HM126F), The Hazardous Materials Registration Program (HM-206), The Marine Pollutants Act (HM-211), etc.

Driver's Guide to Hazardous Materials, American Trucking Association, 1993. A pocket guide that includes checking the shipment, driver responsibilities, emergency procedures, and hazardous materials table.

Transportation of Hazardous Materials, Office of Technology Assessment, 1986. This book describes a broad range of issues involved in the transport of hazardous materials.

A Guide For the Inspection of Hazardous Waste Shipments, prepared by Science Applications International Corporation. U.S. Department of Transportation, 1988.

Wentz, C.A. 1989. *Hazardous Waste Management.* McGraw-Hill Publishing Co. p. 230-268.

NOTES

Worobec, Mary D., and Girard Ordway. *Toxic Substances Controls Guide.* Washington, D.C.: Bureau of National Affairs, Inc., 1989.

Department of Transportation. 1990. *Emergency Response Guidebook.* DOT. p. 5800.5.

Department of Transportation. 1988. *A Guide For the Inspection of Hazardous Waste Shipments by Motor Vehicle or at Freight Facilities.*

TABLE 2{PRIVATE **}**

CORRELATION OF HAZARD CLASS, LABELS, AND PLACARDS

{PRIVATE }	**49 CFR 172. 504** **TABLE 1** **REQUIREMENTS FOR ANY QUANTITY TRANSPORTED**
HAZARD CLASS	**PLACARD(S) LABEL(S)**
EXPLOSIVES 1.1	**EXPLOSIVES** 1.1
1.2	1.2
1.3	1.3
1.4	1.4
1.5	1.5
1.6	1.6
2.3	POISON GAS
4.3	DANGEROUS WHEN WET
6.1 (PG I inhalation hazard only)	POISON
7 (Radioactive Yellow III label only)	RADIOACTIVE

Figure 1-2, not included: waste manifest, and hazardous waste marking

TABLE 2 (CON'T)

CORRELATION OF HAZARD CLASS, LABELS, AND PLACARDS

{PRIVATE }	**49 CFR 172. 504** **TABLE 2** **REQUIREMENTS WHEN MORE THAN 454 kg (1001 lbs) ARE TRANSPORTED**
HAZARD CLASS	**PLACARD(S) LABEL(S)**
1.4	Explosive 1.4
1.5	Blasting Agents 1.5
1.6	Explosives 1.6
2.1	Flammable Gas
2.2	Non-flammable Gas
3 Combustible Liquid	Flammable Combustible
4.1	Flammable Solid
4.2	Spontaneously Combustible
5.1	Oxidizer
5.2	Organic Peroxide
6.1 (PG I & II, other than PG I inhalation hazard)	Poison
6.1 (PG III)	Keep Away From Food
8	Corrosive
9	Class 9
ORM-D	(none required)

PLACARD SUBSTITUTION TABLE

{PRIVATE }Hazard Class or Division Number	Current Placard Name	Old Placard Name
Division 1.1	Explosives 1.1	Explosives
Division 1.2	Explosives 1.2	Explosives A
Division 1.3	Explosives 1.3	Explosives B
Division 1.4	Explosives 1.4	Dangerous
Division 1.5	Explosives 1.5	Blasting Agents
Division 1.6	Explosives 1.6	Dangerous
Division 2.1	Flammable Gas	Flammable Gas
Division 2.2	Non-flammable Gas	Non-flammable Gas
Division 2.3	Poison Gas	Poison Gas
Division 3	Flammable	Flammable
Combustible Liquid	Combustible	Combustible
Division 4.1	Flammable Solid	Flammable Solid
Division 4.2	Spontaneously Combustible	Flammable Solid
Division 4.3	Dangerous When Wet	Flammable Solid W
Division 5.1	Oxidizer	Oxidizer
Division 5.2	Organic Peroxide	Organic Peroxide
Division 6.1, P.G.I. & II	Poison	Poison
Division 6.1, P.G. III	Keep Away From Food	(None Required)
Class 7	Radioactive	Radioactive
Class 8	Corrosive	Corrosive
Class 9	Class 9	(None Required)